The ABIETINEÆ are represented by 2 *Pines* of the *Tœda* and 2 of the *Pinaster* section, and by 2 *Firs*. It is impossible, with the material, to more than guess at the affinities of the fossil with the existing species in such an immense tribe, but 3 are compared with American, and 1 with a European species. The presence of 2 species of the *Parasol Fir* of Japan is of especial interest, if the appearance of a double midrib on the back of the leaf is a reliable character, but a doubt seems to be expressed in the altered termination of the name, "*Sciadopites*." Nearly all the rest are CUPRESSINEÆ, and many are represented by catkins and foliage. The *Widdringtonias*, a section of *Callitris* confined to the Cape and Madagascar, are represented by 2 species. The almost ubiquitous Tertiary *Libocedrus salicornioides*, allied to the Chilian Incense Cedar, is indisputably present, even its glaucous colour being preserved. Two *Thuyas* are indistinguishable from the Chinese and the American Arbor-Vitæ, and a more doubtful form is nearly related to the *Thuyopsis dolabrata* of Japan. A male catkin exactly resembling that of the Red Cedar of Virginia (from which pencils are made) represents the Junipers, and this extraordinary assemblage is completed by the presence of the common European *Cupressus*. The TAXODIEÆ, again, are represented by *Sequoia Langsdorfii*, a widespread and somewhat northern Tertiary Conifer, closely allied to the Californian Red Wood; *Taxodium distichum*, the Deciduous Swamp or Bald Cypress of Virginia, and the well-known Tertiary, *Glyptostrobus*, all but indistinguishable from the living Chinese species. The last described is an American type of *Ephedra*, or Jointed Fir.

A group of Coniferæ must therefore have existed in Europe, almost on one spot, comprising representatives from nearly every Geographical Province. There were present such magnificent representatives of the Californian Coniferæ as the Red Wood, the Sugar Pine, the Douglas Spruce, the scarcely less majestic Bald Cypress, Red Cedar, Thyua, and *Pinus rigida* of more eastern States, the Chilian Incense Cedar, the Parasol Fir, the Arbor-Vitæ, the *Glyptostrobus*, and the *Thuyopsis* of the Eastern Coasts of Asia, the Scotch Fir, the Spruce and the Cypress of Europe, and the Callitris of Southern Africa. Based on the careful research of a man who has made Coniferæ his especial study for fifty years, these determinations have a value which the haphazard methods of so many workers in Fossil Botany do not possess. The causes which led to the dispersion and extinction in Europe, in such relatively recent times, of so considerable a group of Coniferæ would be interesting to tracc out.

The similarity between the Amber Flora and the overlying Brown-coal Flora, described by Heer, lead to the inference that its age must be Middle Miocene. The deposits are uniformly sand, clay, and loam, in which are imbedded partly rolled stones of various kinds and sizes. The whole belongs to a vast and widely spread amber-bearing "diluvial formation" which stretches from the confines of the White Sea into Holland. The richest deposits are situated along a strip of coast between Memel and Dantzic, but the real home of amber has been supposed to lie in the bed of the Baltic between Bornholm and the mainland. It rests upon Cretaceous rocks, and consists chiefly of their debris, forming a peculiar mixture known as "blaue-Erde," which appears to exist throughout the Province of Samland at a depth of 80 to 100 feet, and to contain an almost inexhaustible supply of amber. The authors wish to correct the name to "blau-grün," to distinguish it from the blue earth which accompanies the brown coal in Silesia and elsewhere. Immense quantities of amber are washed out to sea from the coast, or brought down by rivulets and cast up again during storms or in certain winds. The expectations that amber-bearing beds of equal richness would be found at greater depths farther from the sea have not been realised, and these already priceless and apparently inexhaustible coast-deposits have thereby acquired an enhanced importance. It seems probable that the amber-beds of the North Sea belong to the same formation, and that these may even have been continuous to the east coast of Great Britain.

Though the greatest quantity of amber is found on the coast, the largest pieces, 6·5 and 9·5 kilos., were met with inland. It is never found in paying quantities at a greater depth than 4 to 6 feet, and chiefly in the "diluvial beds" with rolled fragments of brown coal, wood, and stones. It is rare in the brown-coal formation, and even when met with is almost confined to the Upper blue and plastic clays. The quantity, however, seems to be inexhaustible, for the rich and celebrated blue-earth of Samland extends along the coast for 60 miles, and possesses a breadth of about 12 miles and an average thickness of 10 feet. Runge estimates that each cubic foot contains $\frac{1}{12}$ lb. of amber, which gives a total of some 9,600,000,000 lbs. The actual yield at present is 200,000 to 300,000 lbs. per annum, or at least five times the quantity estimated to be cast up by the waves of the Baltic on this coast, so that it appears, at the present rate of quarrying, there is a supply for some 30,000 years to come. A good deal of amber, it must be remembered, is cast up on other Baltic shores and along the North Sea.

In an inquiry as to the probable extent of Pine forests that would be required to produce such a bulk of amber, the authors take the Norway Spruce (*Pinus abies*, Linn.) for the purpose of comparison. Estimating that the full age of the species is 120 years, sixty to seventy of which are resin-producing, they conclude that 6000 lbs. per acre would be the product of each generation, and therefore that the Baltic Sea, with its area of 6370 German miles, might yield, if covered with Norway Spruce, 8,408,400,000 lbs., or about an equivalent to the quantity contained in the 20 German square miles of the Samland "blue-earth" referred to above. It thus appears that if this amber in it had been produced on the spot, some 300 generations would have been required to furnish it, but it is of course far more probable that it has been collected together in its present position by the action of water. These estimates being founded on a species relatively poor in resin, even notoriously less resinous than *Pinus austriaca* and other existing species, it is likely that the amber yield was in excess.

The Amber Flora presents a group of cryptogams comprising 20 Fungi, 12 lichens, and about as many mosses—plants hardly represented in any other Tertiary Flora. It is united to other Miocene Floras, not only by its Coniferæ, but by the widely-spread *Cinnamonum polymorphum*. It contains 42 species of Conifers, Cupuliferæ, Betuleæ, Salicineæ, &c., a species of Hakea, in all 27 Monopetalæ and 12 Polypetalæ, including such rarely preserved orders as Scrophulariaceæ, Primulaceæ, Caprifoliaceæ, and Loranthaceæ, the gatherings from forest, meadow, and fen. These are to be described in a forthcoming work. The Coniferæ are, however, of chiefest interest, more especially as, while resembling the resinous species of the present day, their secretions differed so essentially in quality as to have left a product unknown in any other geological age.

J. STARKIE GARDNER

THE STORY OF A BOULDER

THE Warwickshire papers report a curious open-air service held on Sunday last at Stockton, near Rugby, to "consecrate" a large granite boulder which has been inscribed and railed in at the expense of the villagers. It lies on a bed of concrete in the centre of the little place, protected by a handsome iron railing; a few square inches are polished to show the grain; an inscription records that it was brought from Mount Sorrel, a distance

of sixty miles, by an iceberg or a glacier in the great Ice Age; and the ground around it is to be inclosed, turfed, planted, and set with rustic seats. A fine day, and the novel proceeding, drew a large and attentive crowd; a short, bright service was conducted with the aid of an unusually good village choir; and the big stone set up by Joshua at Shechem formed the text for a sermon intended to stamp the boulder as a religious no less than a scientific monument.

This charming little idyll is the closing chapter in a story which might claim to share the title made historic by a great geologist. Five years ago the present rector, coming to Stockton, found the boulder lying in a ditch, into which it had been rolled from its inconvenient position by the roadside. A hazy clerical belief that it was "Druidic" had saved it from complete destruction; but it was the cockshy of all the children, bonfires were lighted on it occasionally, and it lay at the mercy of every field club which might come hammering that way. Large, glaciated, and of granite, it was clearly worth preserving. The new rector told its probable history from the pulpit, and the village mind was roused. Reports came in of other big stones far and near, some of which were also of glacial origin; the quarrymen in the adjoining lime-works, digging down to a smaller piece of granite and some beautifully striated blocks of sandstone, protected instead of breaking them; and by following up the hint thus given, a fine bed of boulder clay was uncovered, shown to Dr. Crosskey, and inserted in the Boulder Committee Report of the British Association. The fame of the great stone spread; visitors came to see it; the Stocktonians, who had through frequent lectures learnt its scientific value, became proud of their "Pibble" and of their ability to instruct their neighbours; the subscription point was reached, and money found to move and rail in the treasure; the surrounding villages finally emptied themselves to attend the consecration service, and Stockton is at this moment, like douce Davie Deans, "as uplifted as a midden-cock on pattens."

The moral of the story is twofold. First: what has been done in Stockton ought to be done in scores of other villages. This boulder was the first link in a chain of evidence, lengthening ever since, in favour of a new and pregnant probability, the current of an ice-sheet from the Charnwood Forest heights across the table-land of South Warwickshire. In countless corners more lie similar monuments, unknown and doomed, which, if thus preserved and studied, would afford the keys to like problems in geology. And secondly: the clergy ought to do it. Our country parsons are, if they could be educated to see it, the natural discoverers and conservators of local relics; with the opportunities they have and the attainments they ought to possess, they might in their mere leisure write such a scientific history of England as no country has yet possessed. Let them read the delightful chapter in *Le Maudit*, which paints the Curé Julio in his Pyrenean parish, and in order that they may be qualified to imitate him, let the bishops be wise in their generation, and exact a knowledge of some branch of natural history from every candidate for Orders.

REPORT OF THE PARIS OBSERVATORY FOR THE YEAR 1882

WE have received from Admiral Mouchez, the Director of the Paris Observatory, the report on the state of that Observatory for the past year, and as we recently made reference to the state of our own Greenwich Observatory on the occasion of the visitation which took place at the beginning of the present month, we think it may interest our readers. if we make a few extracts from this report of Admiral Mouchez.

The report opens with a complaint that the service of the Observatory has been very considerably deranged by the preparations for the transit of Venus. Not only did the various members of the expedition attend at the Observatory in order to be trained either in photography or in the use of the artificial transit, but no less than five of the *personnel* of the Observatory themselves took part in the work. At the same time, says Admiral Mouchez, the past year may take rank with any of its predecessors when the increased work of the Observatory is taken into account, for during this time an extension of ground has taken place, the equatorial coudé has been installed, and several underground chambers have been constructed for the purpose of studying magnetism and terrestrial physics generally. Curiously enough, one of the grounds on which the addition of magnetical studies to the work of the Observatory is urged is, that the cloudy skies of Paris so frequently interrupt the purely astronomical observations, that, without some such work as it is now proposed to add, the observers would frequently have little to do.

Among the purely astronomical work of the Observatory which has been going on for the last four years is that of the revision of Lalande's catalogue of stars, numbering 40,000. Concerning this work, we are informed that the General Catalogue, which will form eight volumes in quarto, is well in hand, and it is hoped that two volumes will be published each year, or at all events four volumes during the next three years. To assist in the construction of the catalogue, 110,000 meridian observations have been made during the last four years.

The employment of ordinary equatorials in an observatory, remarks Admiral Mouchez, necessitates a continual change of position of the observer, he being compelled to follow the movement of the eyepiece into positions which are often inconvenient and fatiguing, whilst the heavy dome of the observatory has also to be constantly rotated to follow the motion of the telescope. In order to obviate the necessity for this, M. Lœwy conceived the idea of adapting to the equatorial the system of "lunette brisée," employed first in England, and afterwards to a greater extent in Germany, especially in small transit instruments.

The new coudé equatorial may be thus described:—The polar axis of the instrument is supported at its extremities on two pillars like a meridian instrument. Round this axis the telescope turns, forming a right angle at the lower support. By means of a mirror placed at the summit of this angle the light is reflected along the pierced axis, at the end of which the eyepiece or the micrometer is placed. Under these conditions, with the telescope at rest, the equatorial stars pass across the observer's field of view. But of course the telescope must not be limited to the observation of equatorial stars. In order to secure the observation of other stars, a mirror free to rotate is placed before the object-glass and connected with the declination circle. The inclination of this mirror may be changed so as to throw the light coming from a star of any declination into the tube. This arrangement therefore permits the observer to explore every part of the heavens without quitting his position at one end of the polar axis. The telescope may, practically, by a rotation of this axis, be directed towards any part of the celestial equator, whilst a star of any declination may be made to throw its light down the broken telescope by means of the external mirror. It might be imagined that in this latter case the double reflection would result in the loss of a good deal of light, but we read that the preliminary experiments have shown that this is not the case, and that the polish and figure of the mirrors are very satisfactory. They are silvered, and of course can be easily repolished. We should add that this instrument, now one of the actualities of the Observatory, is due to the liberality of Mr. Bischoffsheim.

With regard to more strictly physical observations, those who have made their complaint respecting the